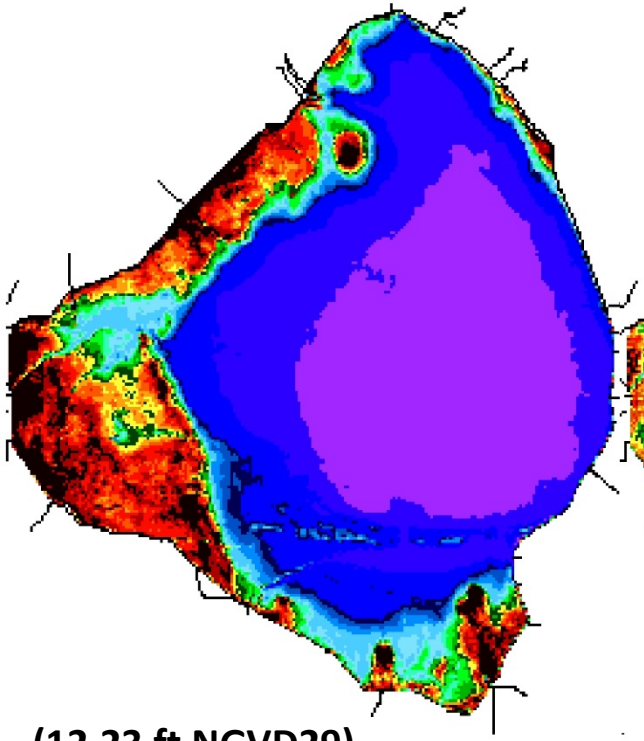
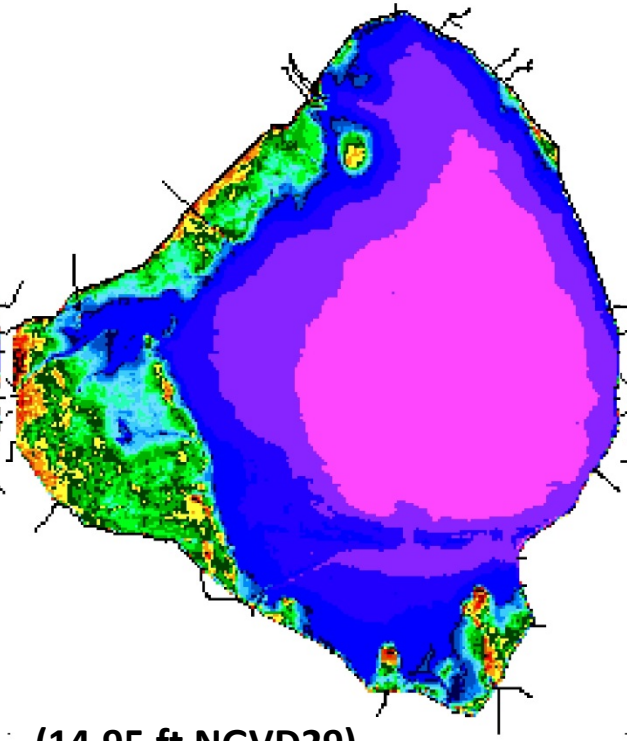
Lake Okeechobee Water Depth Maps

1 Year Ago: 08/01/2015



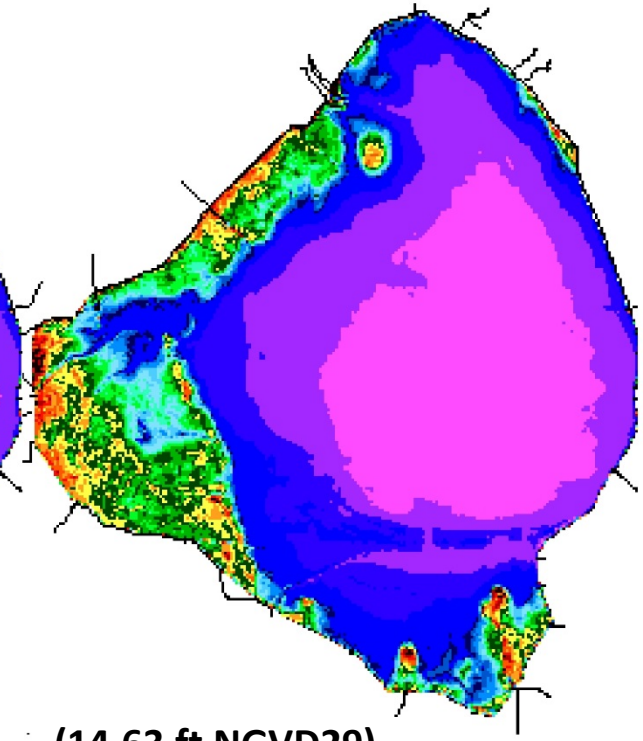
(12.23 ft NGVD29)

1 Month Ago: 07/02/2016

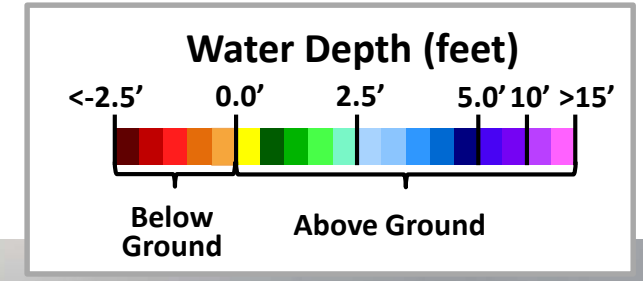


(14.95 ft NGVD29)

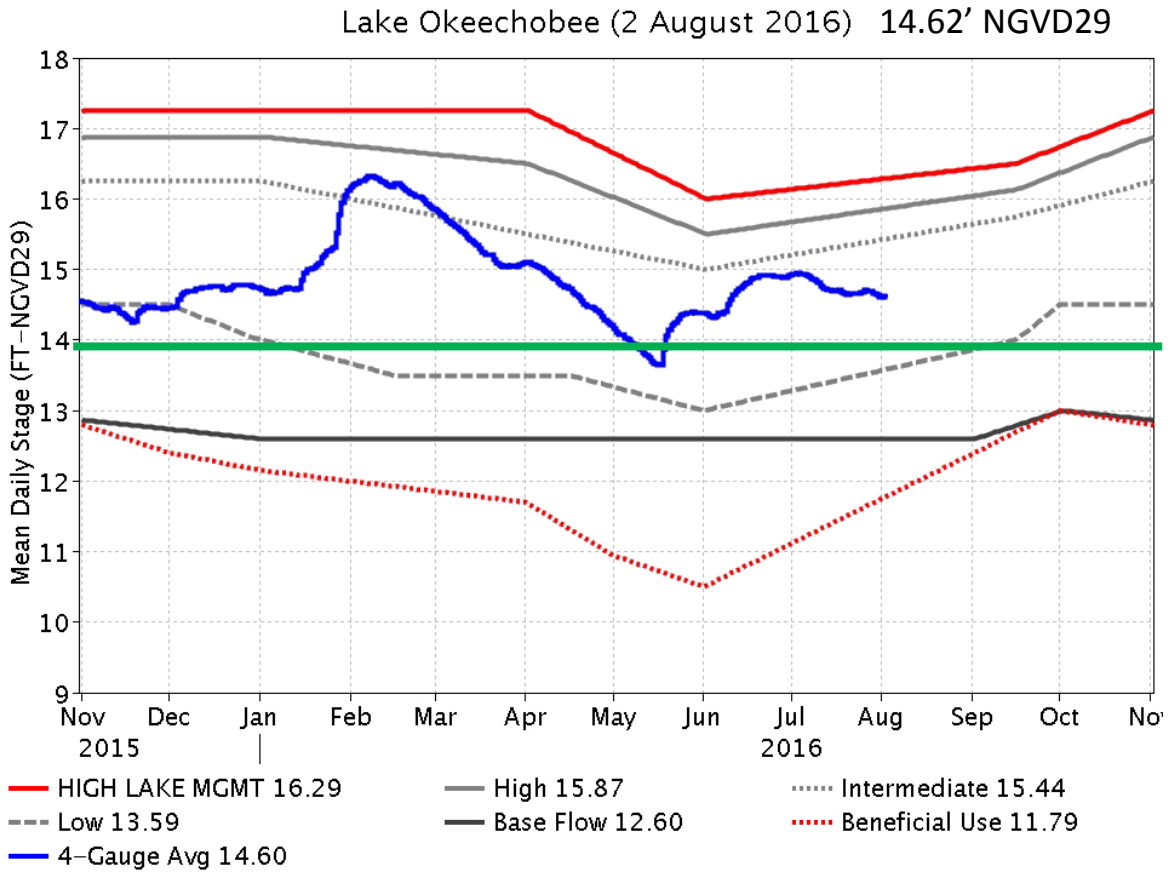
Current: 08/01/2016



(14.63 ft NGVD29)



Lake Okeechobee Water Levels

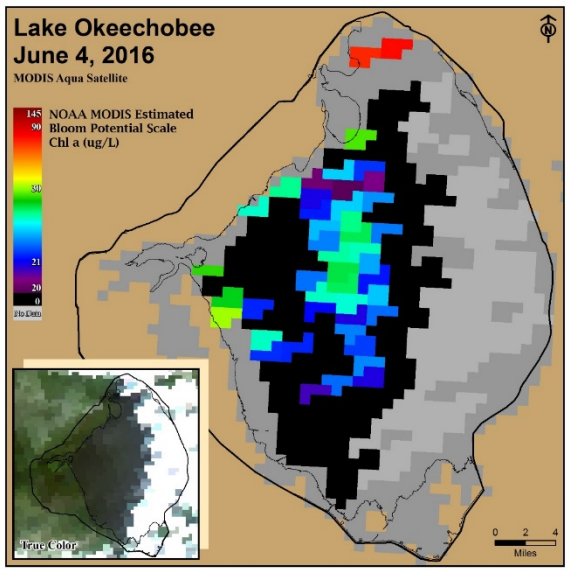


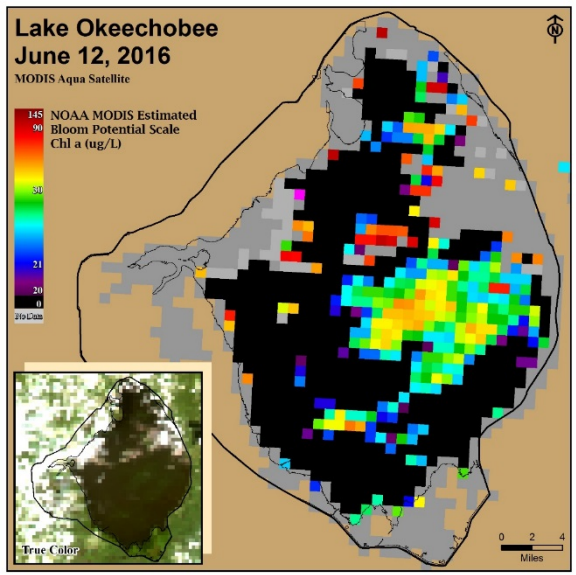
- El Nino rainfall resulted in high lake stages in Winter and Spring
- Army Corps of Engineers is making discharges to Caloosahatchee and St. Lucie to gain lake storage for hurricane season
- Until recently, WCAs were above regulation schedule
- Smaller discharges to L-8 Canal to C-51 Canal

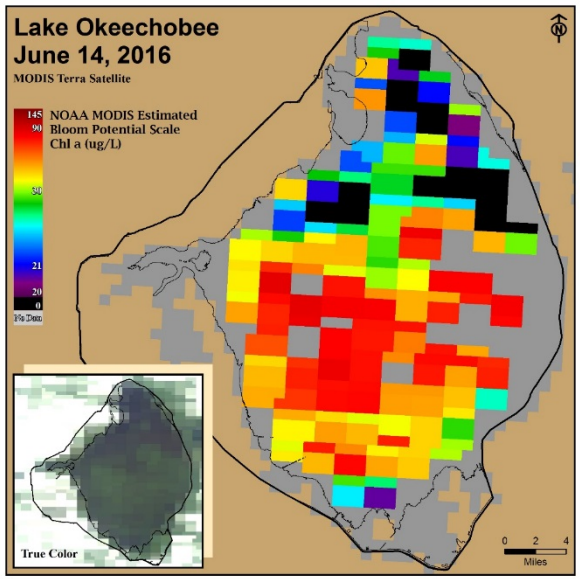
Lake Okeechobee has been above 14' NGVD almost continuously for 10 months (since September 2015)

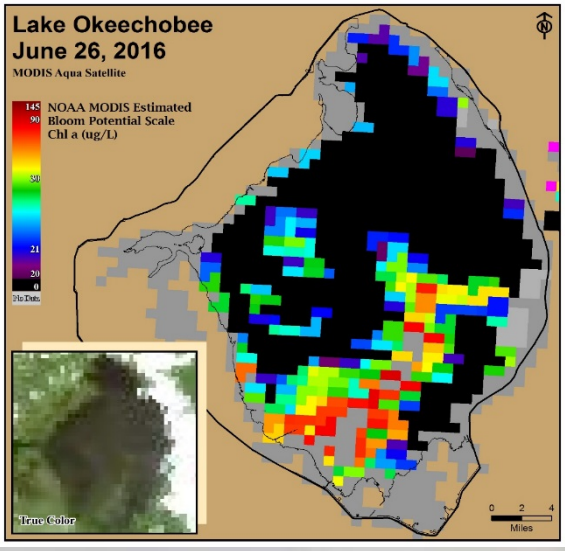
Lake Okeechobee Algal Blooms

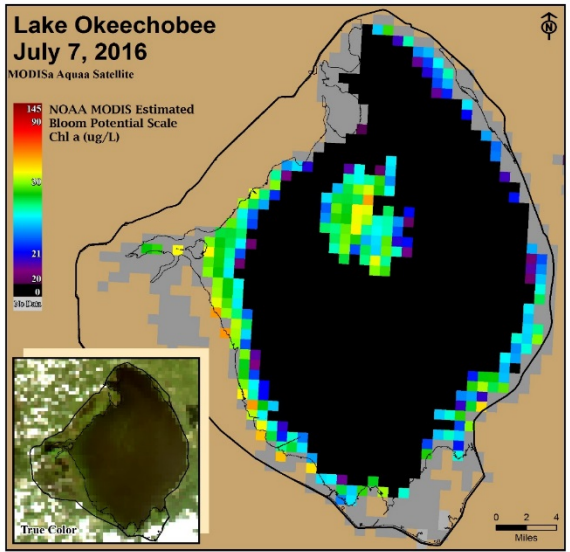
NOAA - Unvalidated and Experimental Data

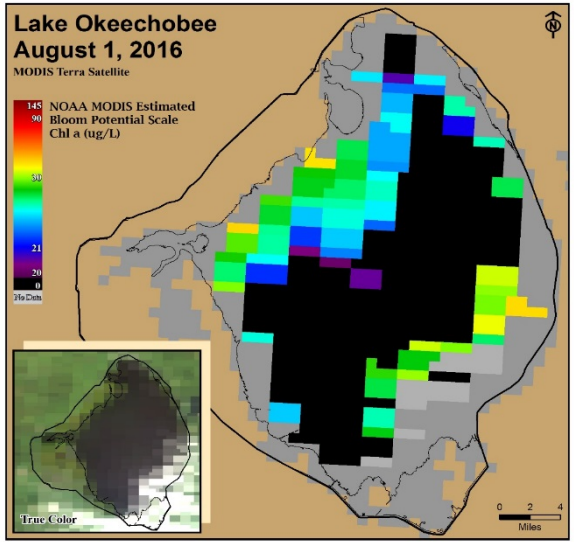






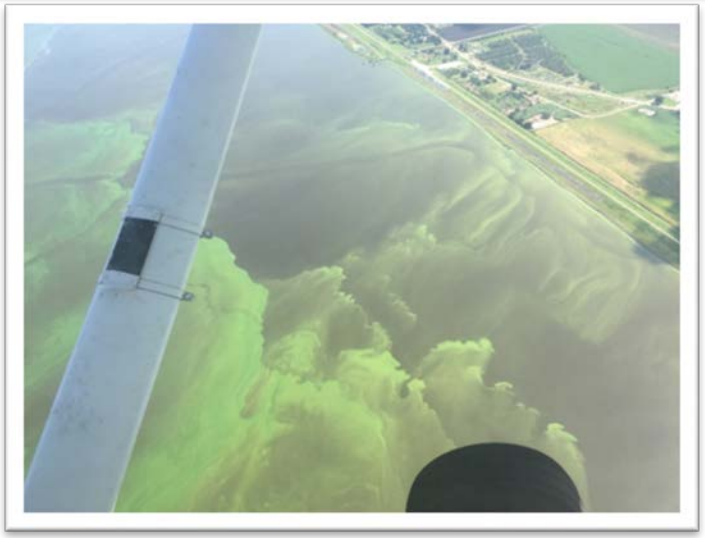






Lake Okeechobee Bloom Conditions

Lake Okeechobee L0006 6/23/16



Lake Okeechobee near Pahokee
July 10, 2016

Lake Okeechobee looking towards Clewiston 5/16

Lake Okeechobee near S-308
July 8, 2016

Widespread Algal Blooms in the St. Lucie Estuary in Late June

Shepherd's Park 6/1/2016

Blue-Green Algae Blooms

- Algal blooms are naturally occurring – common in summer and can appear in any body of water at any time when the right conditions occur
- Blue-green algae (cyanobacteria) can, don't always, produce toxins that can be harmful to humans, pets and wildlife
- Elevated nutrient levels are principal cause of blue-green algal blooms
- Warm temperatures, long days and stagnant conditions are also factors
- Lake Okeechobee blue-green algal blooms are strongly associated with lake stages above 14' NGVD

EPA United States Environmental Protection Agency

July, 2016

Freshwater HABs News

Blooms, Blooms and more Blooms!!!

Florida - officials declared a state of emergency in four counties.

Ohio – non-toxic algae bloom on Maumee River and parts of the Auglaize River

California -algae bloom in Discovery Bay and Pyramid Lake

New York - harmful algal bloom in Owasco Lake

Utah - algal bloom in Utah Lake and the Jordan River

North Dakota – microcystin in Bowman-Haley Reservoir and Paterson Lake

Blue-Green Algae Blooms

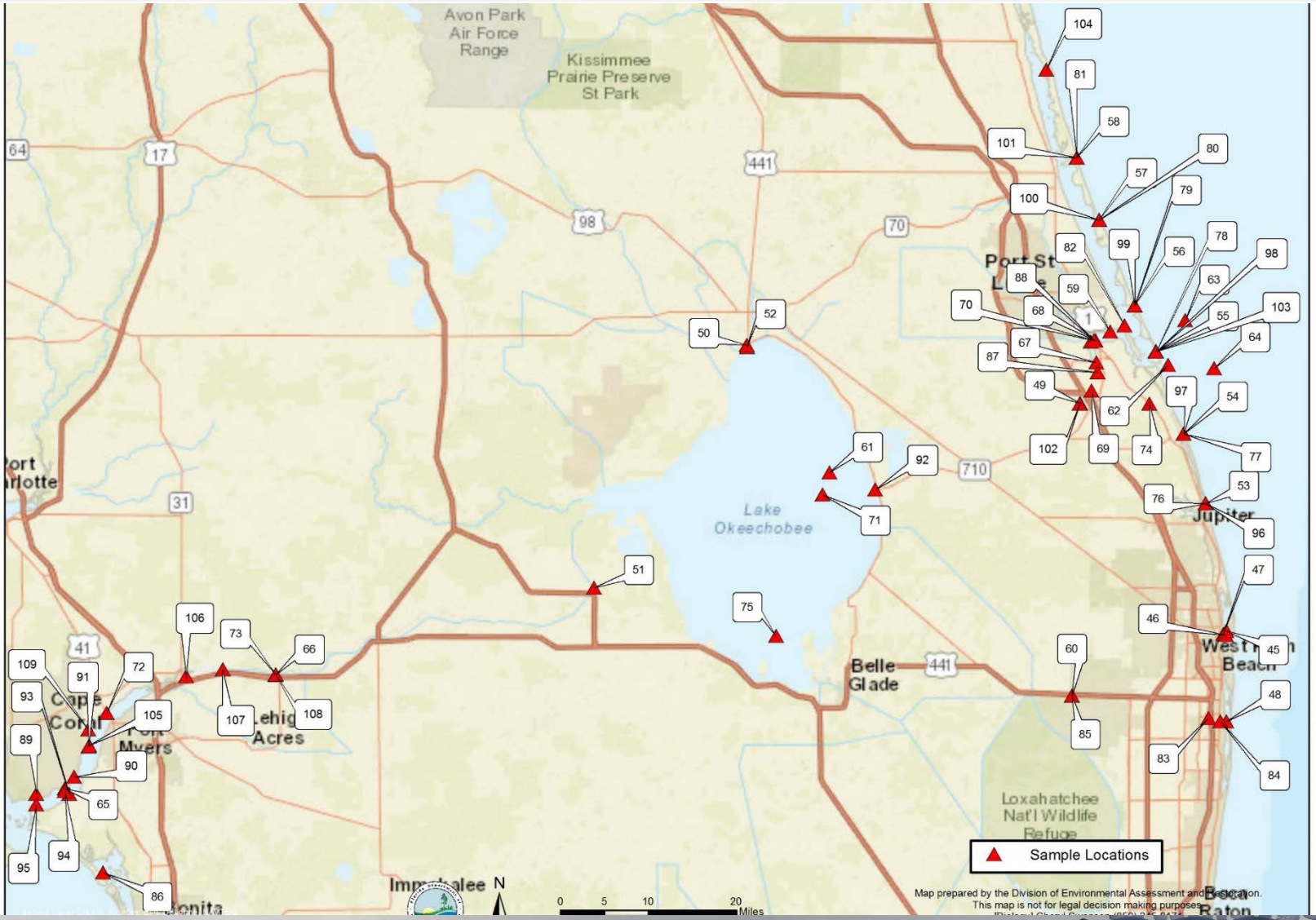
- Governor Scott issued emergency order June 29/30 for Martin, St. Lucie, Lee & Palm Beach Counties
- Dept. of Environmental Protection and Florida Dept. of Health, Florida Fish & Wildlife Conservation Commission & SFWMD coordinating on bloom response
- District responsible for water quality sampling in Lake Okeechobee and where requested by DEP
  - If you spot a bloom, call the Department of Environmental Protection's bloom reporting hotline at 855-305-3903 or visit
    - https://depnewsroom.wordpress.com/algal-bloom-monitoring-and-response/

C-51 Canal

Blue-Green Algae Toxicity Testing

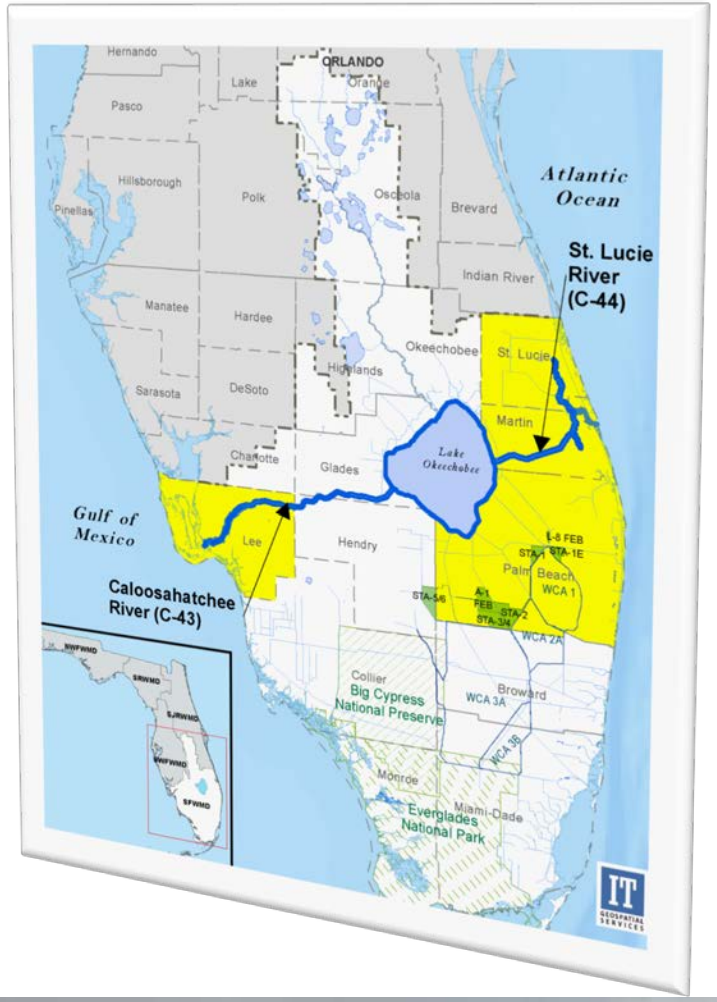
- Blue-green algae may or may not contain toxins – cannot tell simply by appearance, requires specialized testing
- No federal or state water quality standards for cyanobacteria toxins
- Levels under 10 micrograms per liter considered a low-level health risk from short term recreational exposure
- Sampling results reported on DEP's statewide tracking system
  - Samples taken by DEP or SFWMD
  - Samples analyzed by DEP
  - Algae identification
  - Microcystin

DEP Algal Bloom Sampling Locations – July



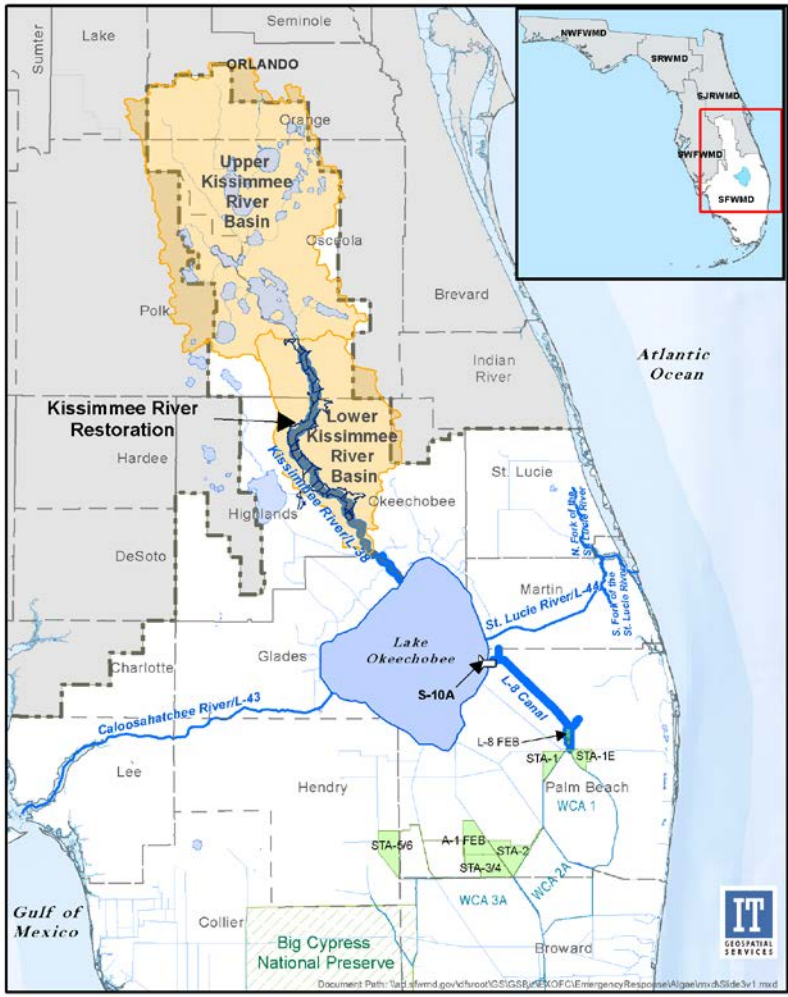
District Response to Emergency Order: Three-Part Approach

- Temporary operational measures
  - Kissimmee Chain of Lakes operations
  - Moving water south via L-8 and C-51
  - Exercising operational flexibility
- Expediting projects on public lands
  - DuPuis Wildlife Management Area
  - Section C Water Farm located in the C-23 /C-24 Basin
- Temporary measures on private lands
  - Florida Power and Light's cooling pond
  - Emergency pumping at Bluefield Grove, Sunrise Grove and Caulkins Citrus

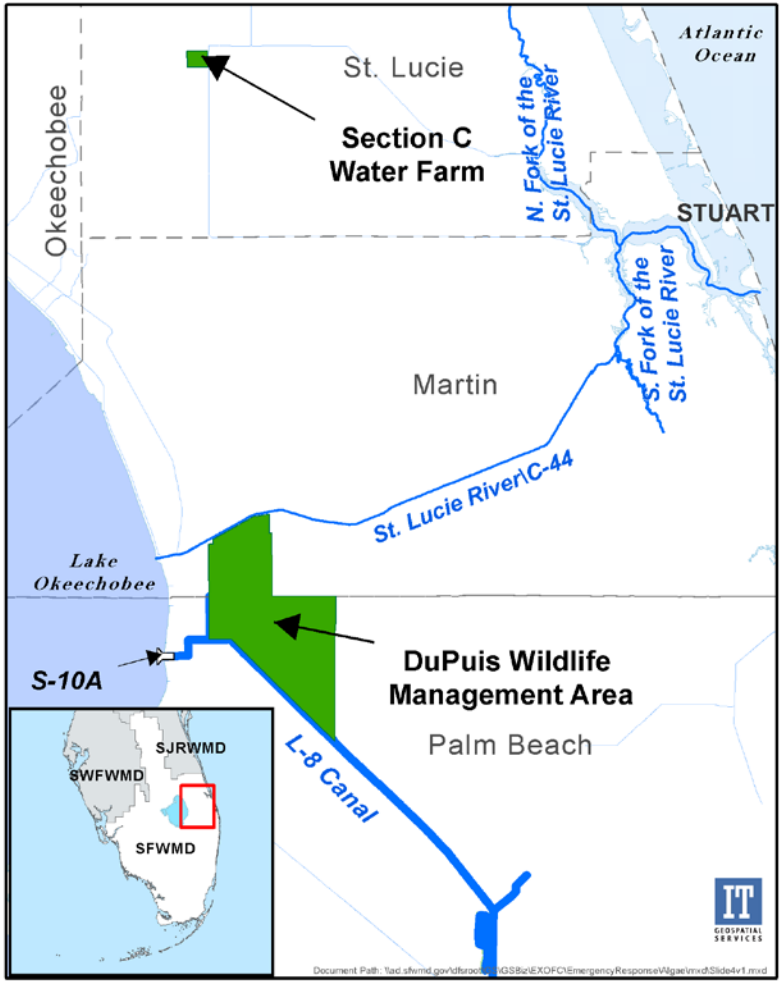


Temporary Operational Measures

- Holding additional water in the Kissimmee Chain of Lakes
  - Slows flow of water into Lake Okeechobee
  - Reduction in volumes east/west
- Increased Lake Okeechobee discharges to the south
  - Optimizing water flow south through the L-8 and C-51 canals
  - Discharges to STAs/FEB/WCAs



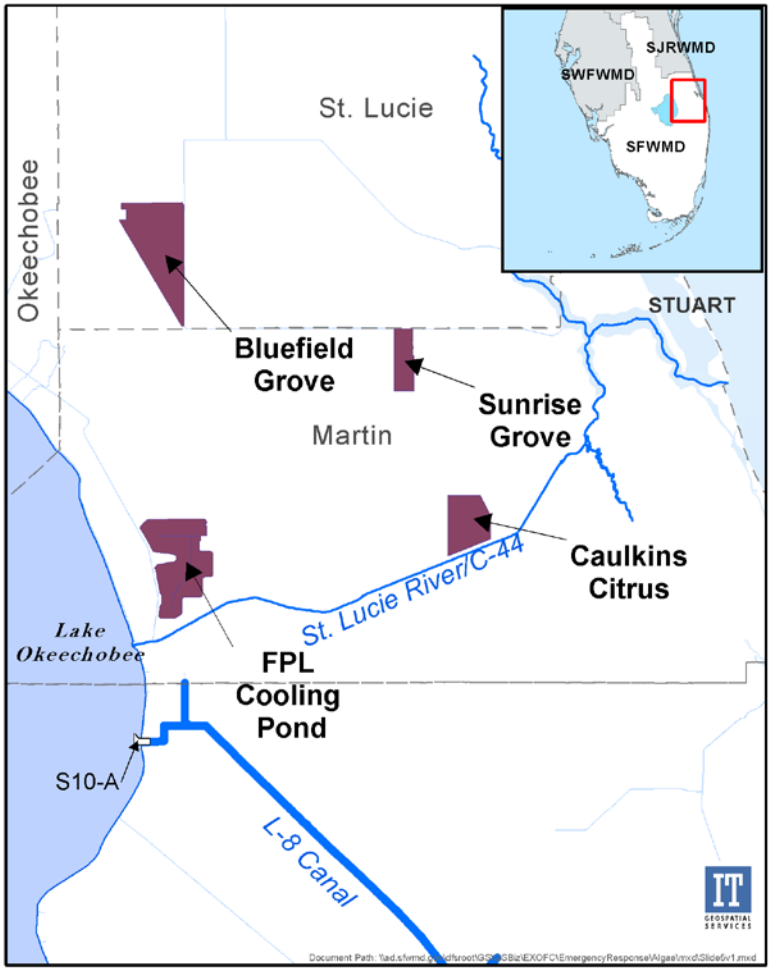
Expediting Dispersed Storage and Retention Projects on Public Lands



- DuPuis Wildlife Management Area - Dispersed Water Mgmt
  - Expediting implementation of water management measures necessary to better manage stormwater runoff
- Water Farm on Section C in the C-23/C-24 Basin
  - Expediting construction of a 320-acre impoundment next to C-23 Canal
  - Board approved $2.6 million in emergency funding
  - DEP permit issued 7/15/16
  - ACOE permit applied for and pending

Temporary Emergency Actions on Private Lands

- Florida Power and Light's Martin County Cooling Reservoir
  - Temporarily store Lake Okeechobee water withdrawn from the C-44 Canal (~2.2 billion gallons per month)
  - Storage will continue for approximately three to four months
- Emergency pumping at Bluefield Grove, Sunrise Grove and Caulkins Citrus
  - Stormwater will be retained onsite within existing water management facilities
  - Consistent with agricultural operations
  - Will not supersede the landowners' ability to provide flood protection



St. Lucie Estuary

Weekly Average Inflow
July 26 - Aug 1, 2016

Inflow from Lake	629 cfs
C-44 Basin Inflow	26 cfs
Ten Mile Creek	85 cfs
C-23	90 cfs
C-24	0 cfs
Tidal Basin Inflow	163 cfs
Total	993 cfs

Data provisional and subject to change

Total Flow (cfs)

15,000
13,500
12,000
10,500
9,000
7,500
6,000
4,500
3,000
1,500
0

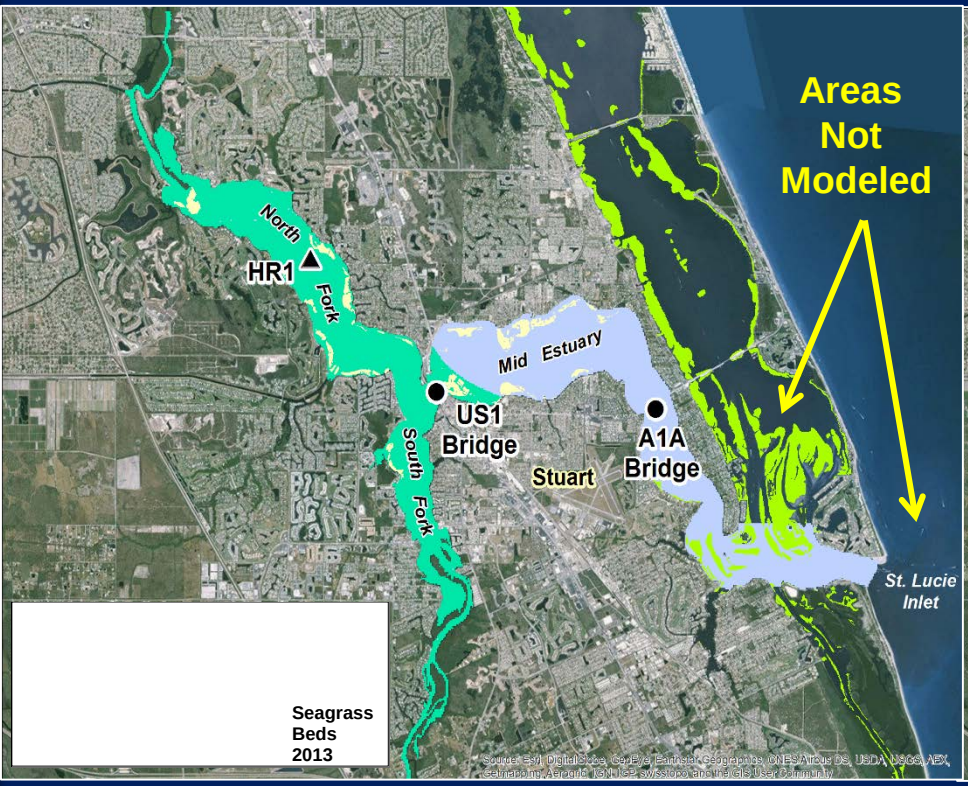
1-Aug 1-Sep 1-Oct 1-Nov 1-Dec 1-Jan 1-Feb 1-Mar 1-Apr 1-May 1-Jun 1-Jul 1-Aug

Inflow from Lake* (using downstream gauge)
C-44 Basin Runoff
Inflow from C-24, C23, and Ten Mile Creek
Tidal Basin Inflow

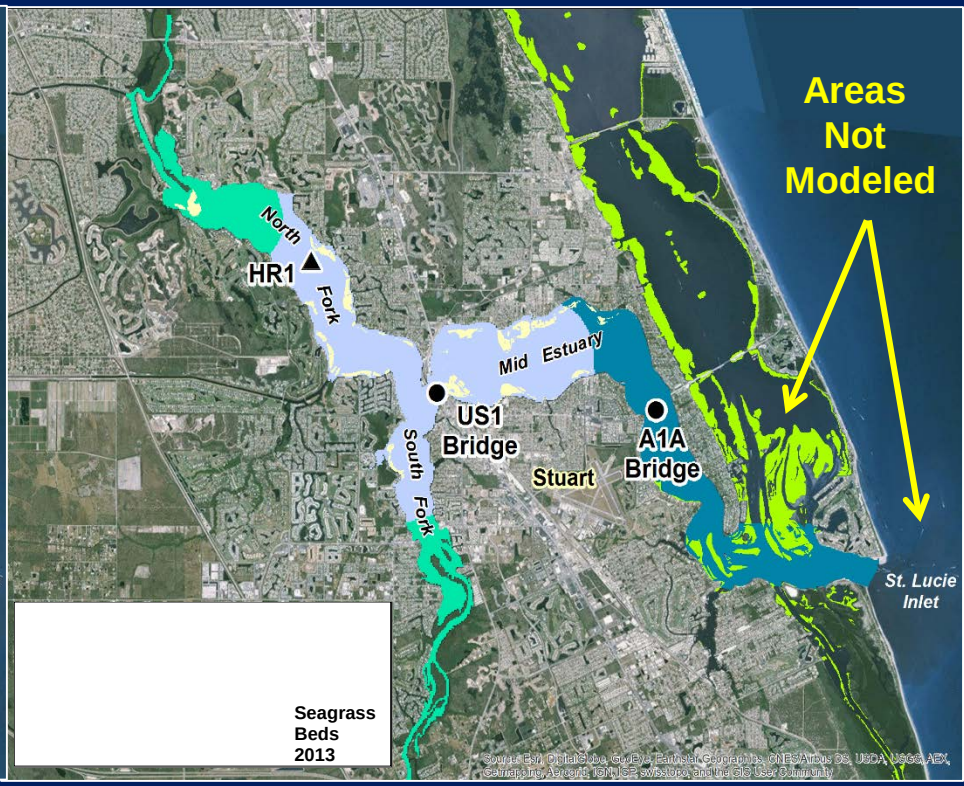
St. Lucie Estuary

Salinity Conditions

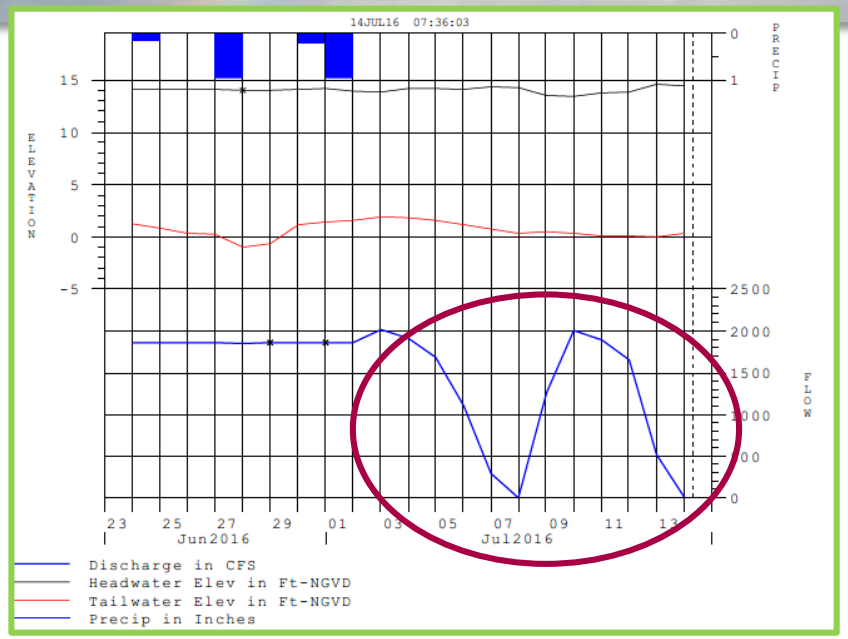
July 11, 2016

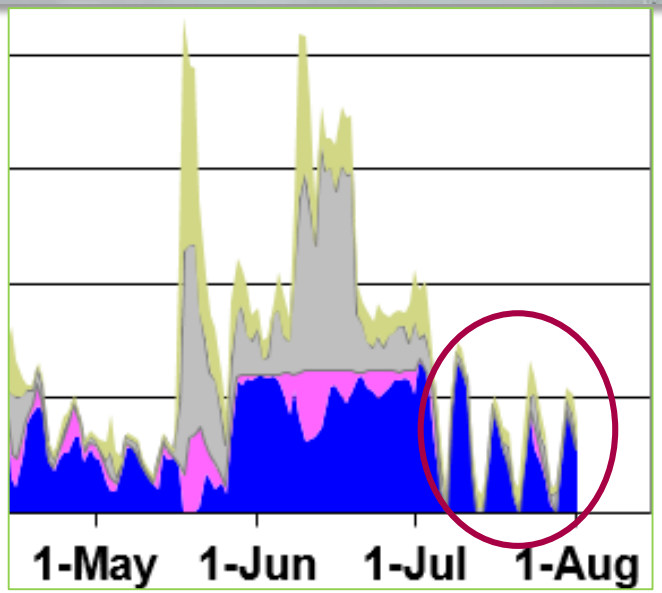


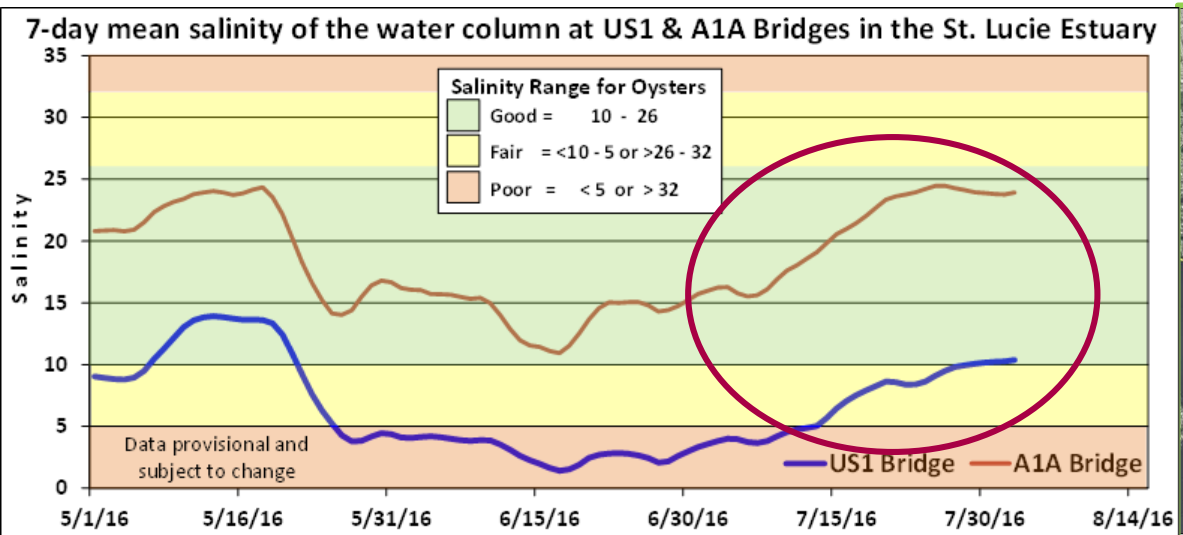
August 1, 2016

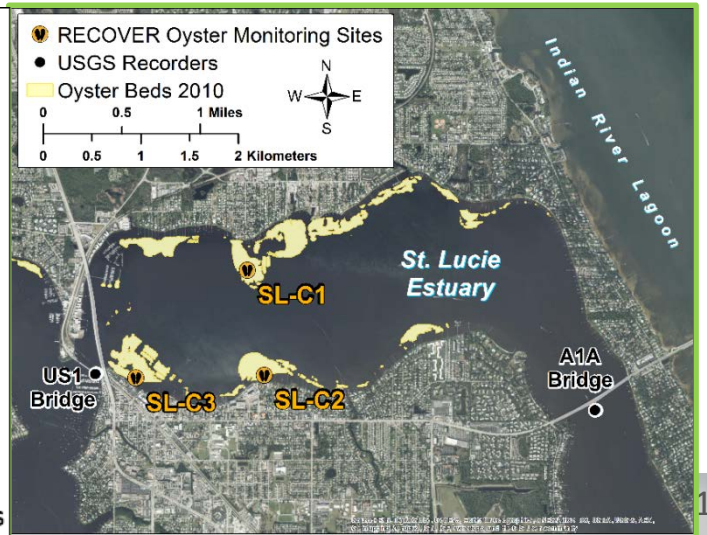


Positive Estuary Response to Pulse Pattern and Reduced Discharge



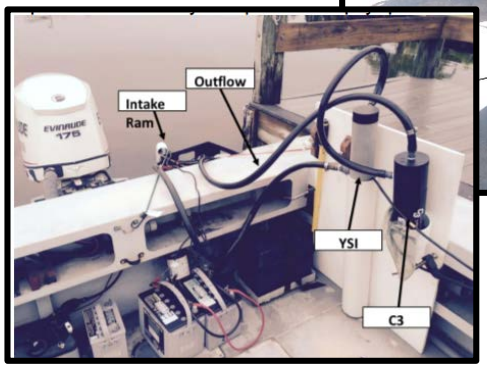






Sampling from St. Lucie Inlet to Lake Okeechobee

District Scientists Collecting in St. Lucie Estuary



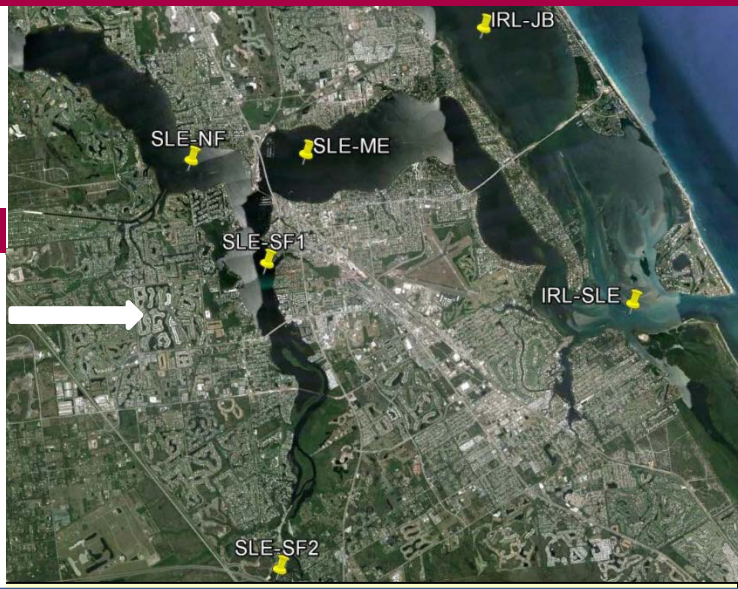
Onboard Flow Through System Used for Water Quality Mapping

- 7-7-16 transect data collection
  - *St. Lucie Inlet to North Fork Narrows*
  - *South Fork to St. Lucie Locks (S-80)*
  - *C-44 Canal from S-80 to Port Mayaca*
- Sampled water continuously at 0.5 m depth using a flow through system:
  - Temperature
  - Specific Conductivity
  - Turbidity
  - Blue Green Algae
  - Dissolved Oxygen
  - * Salinity
  - * pH
  - * Chlorophyll a
  - * CDOM (Color)
- Same data collected on 4-28-16 under pre-bloom conditions

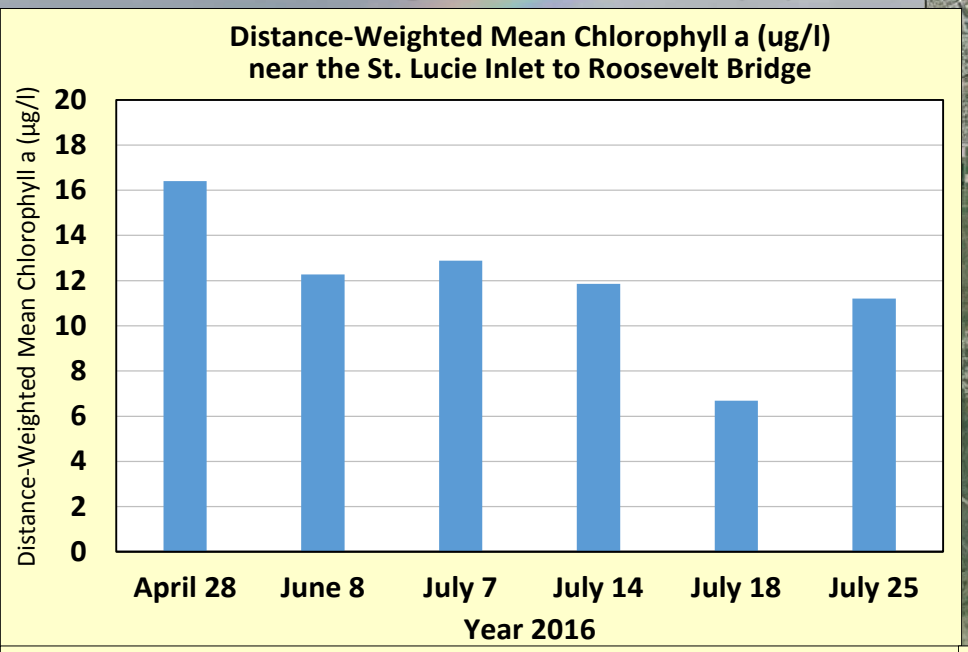
St. Lucie Estuary measurements of Chlorophyll *a*

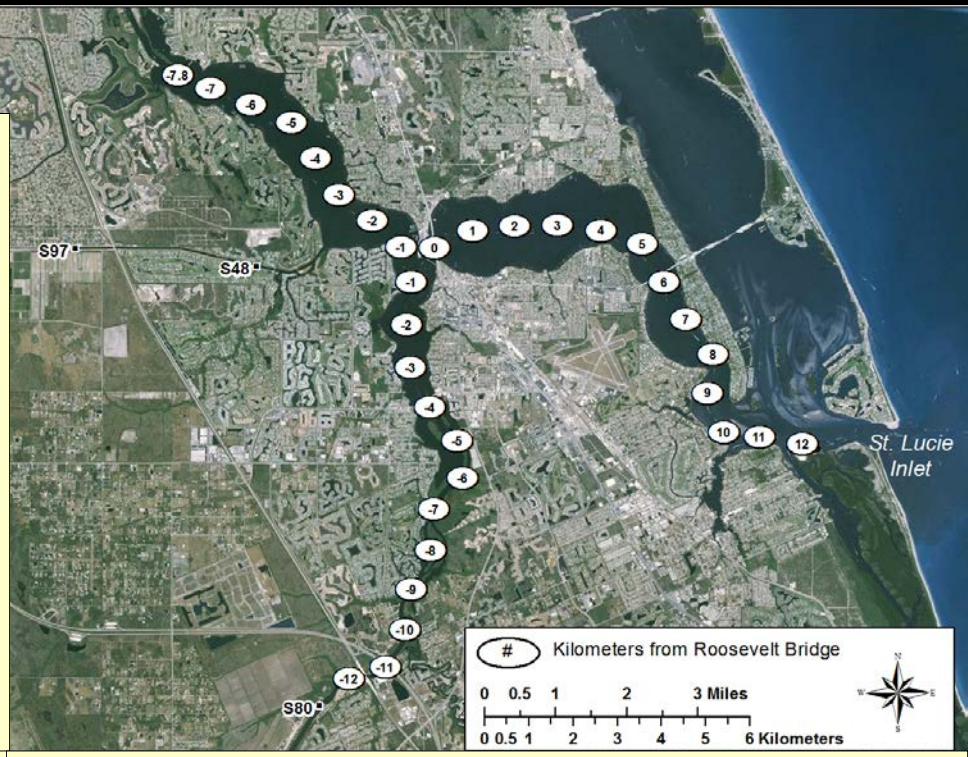
SFWMD water quality mapping survey track (left)

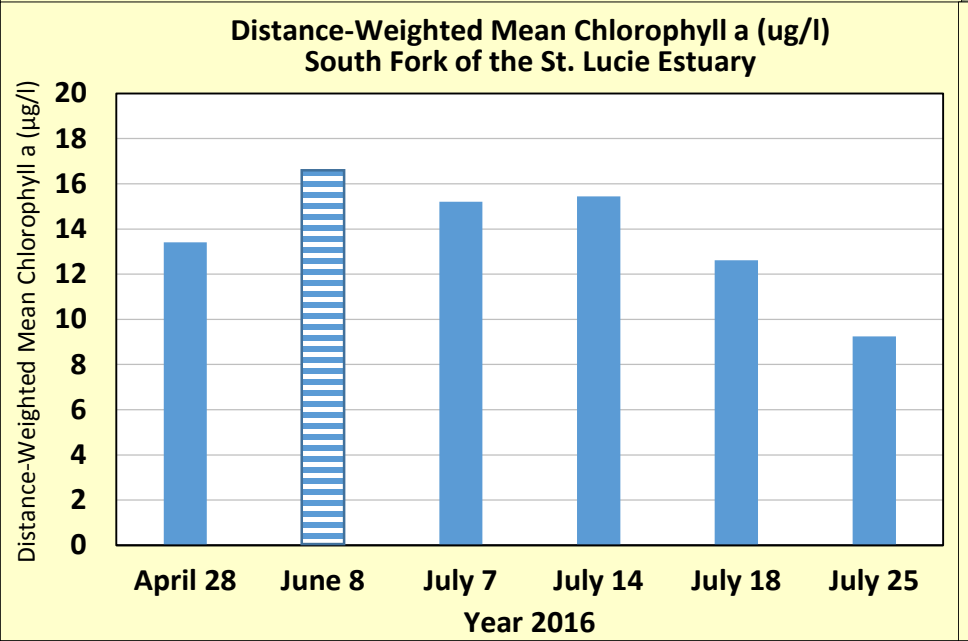
Location of the LOBO stations managed by Harbor Branch/ Florida Atlantic University (right)

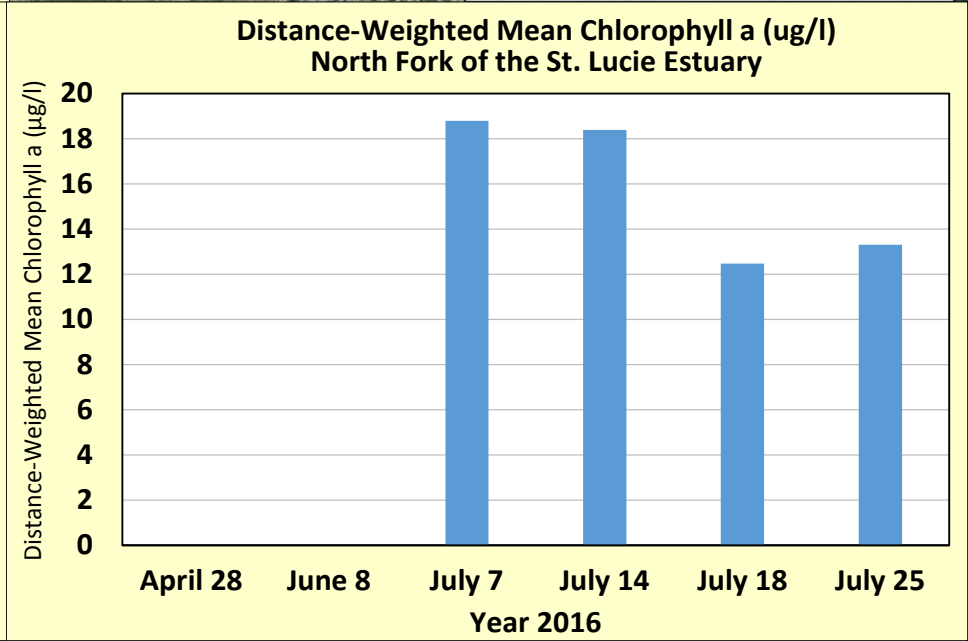


St. Lucie Estuary
2016 Distance-Weighted Mean Chlorophyll a



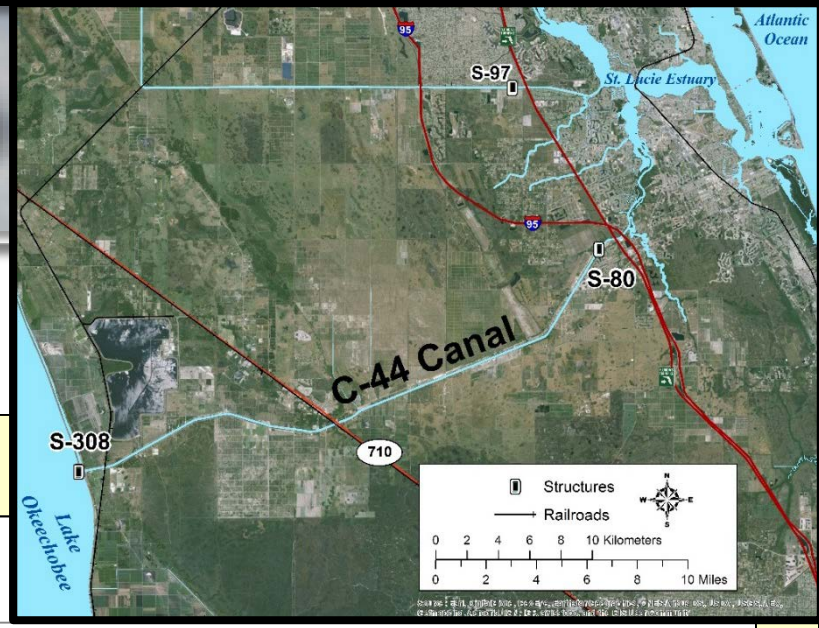


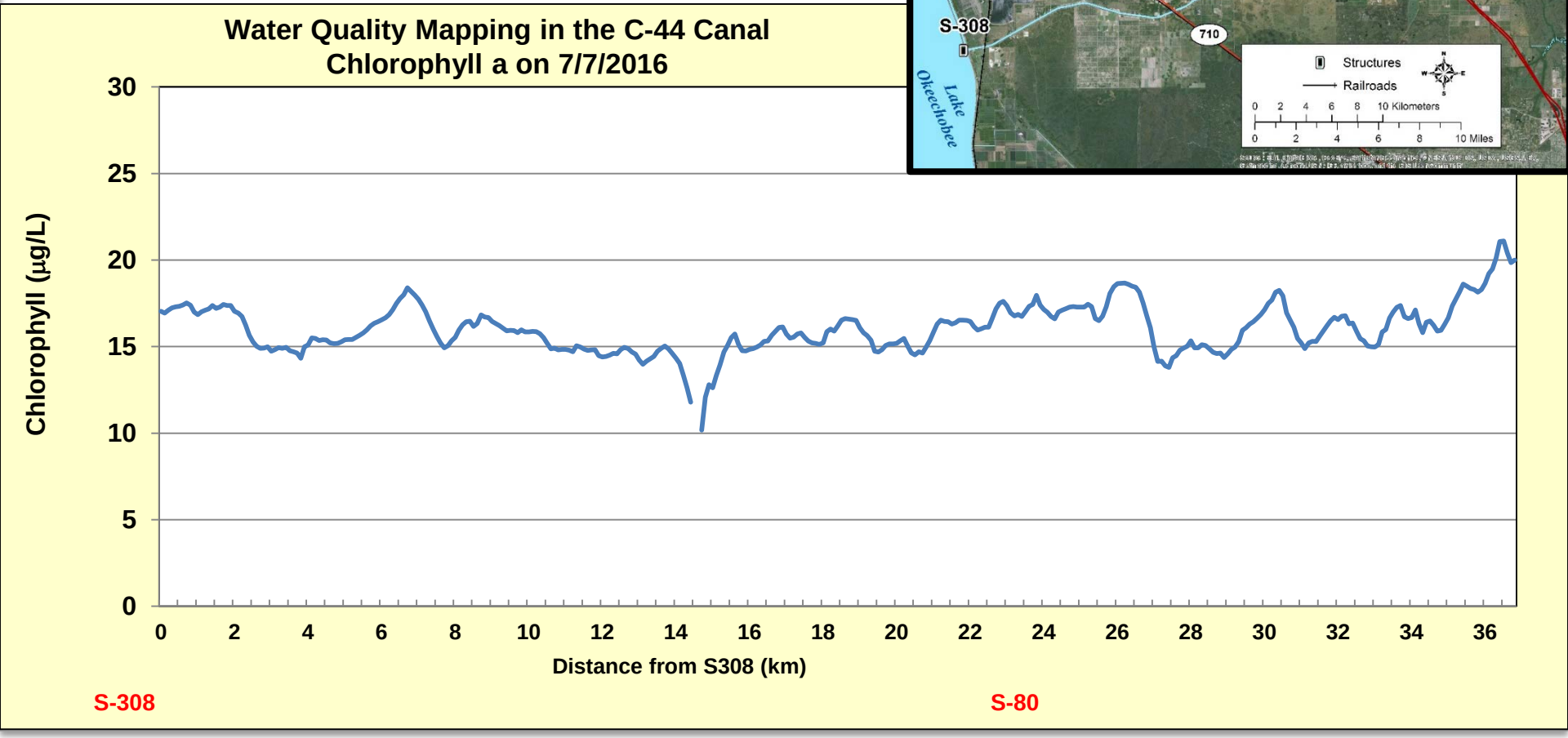




C-44 Canal Chlorophyll *a* Measurements from S-80 to S-308

*(*Elevated Chl a generally > 30 ug/L)*

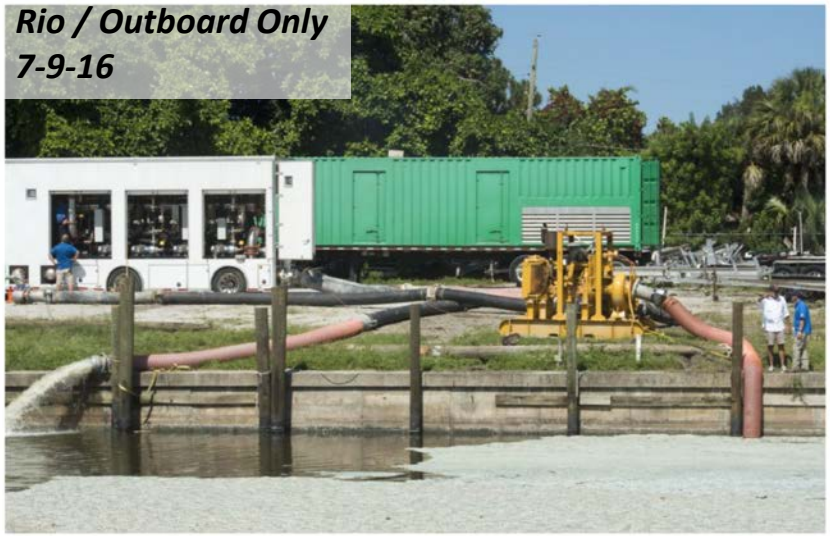




Positive Estuary Response to Pulse Pattern and Reduced Discharge

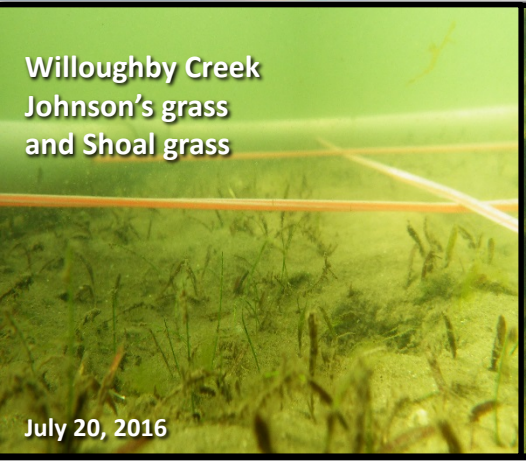
Algae Build-Up Persisted in Boat Basins and Dead-End Canals

Mechanical Removal Pilot Project and Natural Dispersal

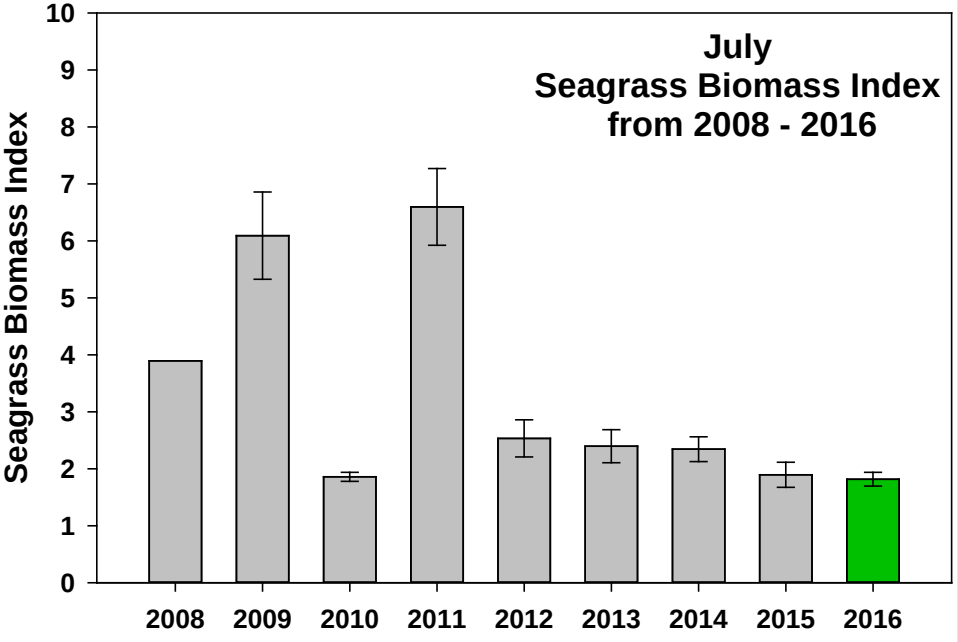


St. Lucie Inlet 7-8-16

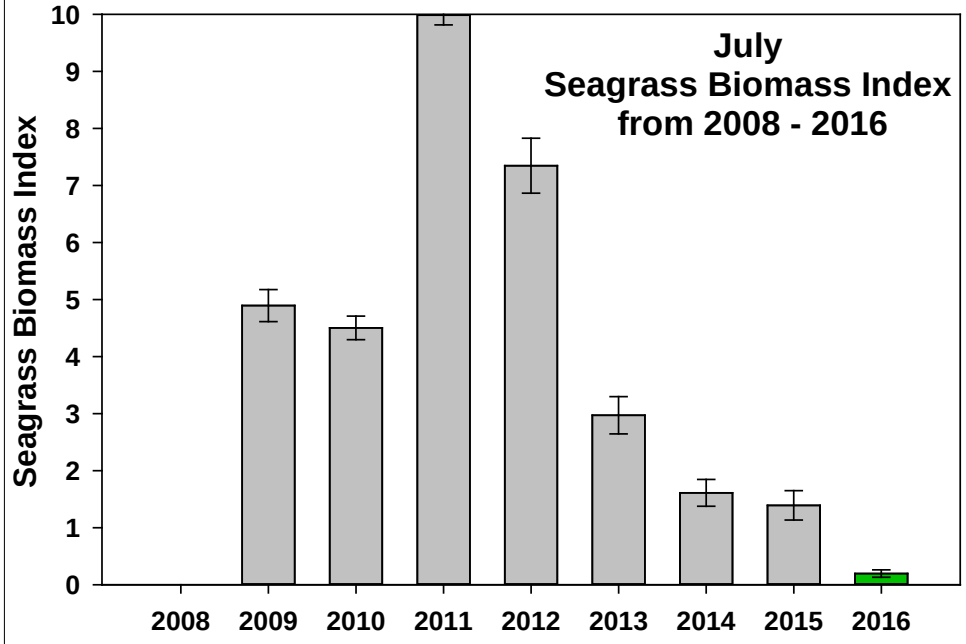
St. Lucie Estuary Seagrass



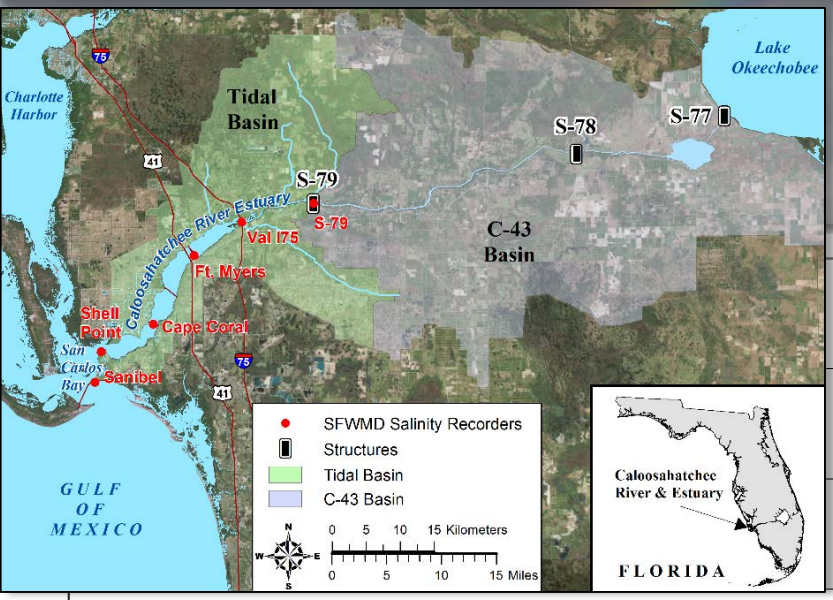
Willoughby Creek



Boy Scout Island



Caloosahatchee Estuary



Weekly Average Inflow
July 26 - August 1, 2016

Inflow from Lake:	866 cfs
C-43 Basin Inflow:	2443 cfs
Tidal Basin Inflow:	1327 cfs
Total :	4636 cfs

Data are provisional and subject to change

Total Flow (cfs)

18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0

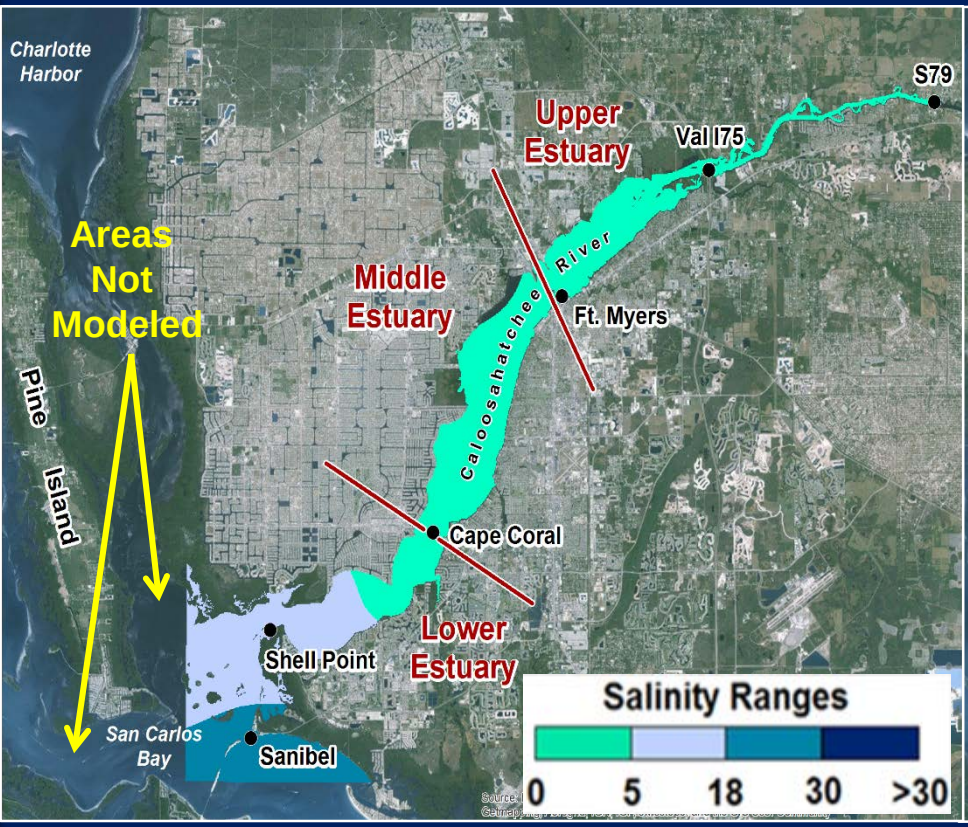
1-Aug 1-Sep 1-Oct 1-Nov 1-Dec 1-Jan 1-Feb 1-Mar 1-Apr 1-May 1-Jun 1-Jul 1-Aug

Inflow from Lake* (using downstream gauge) C-43 Basin Inflow Tidal Basin Inflow (downstream of S79)

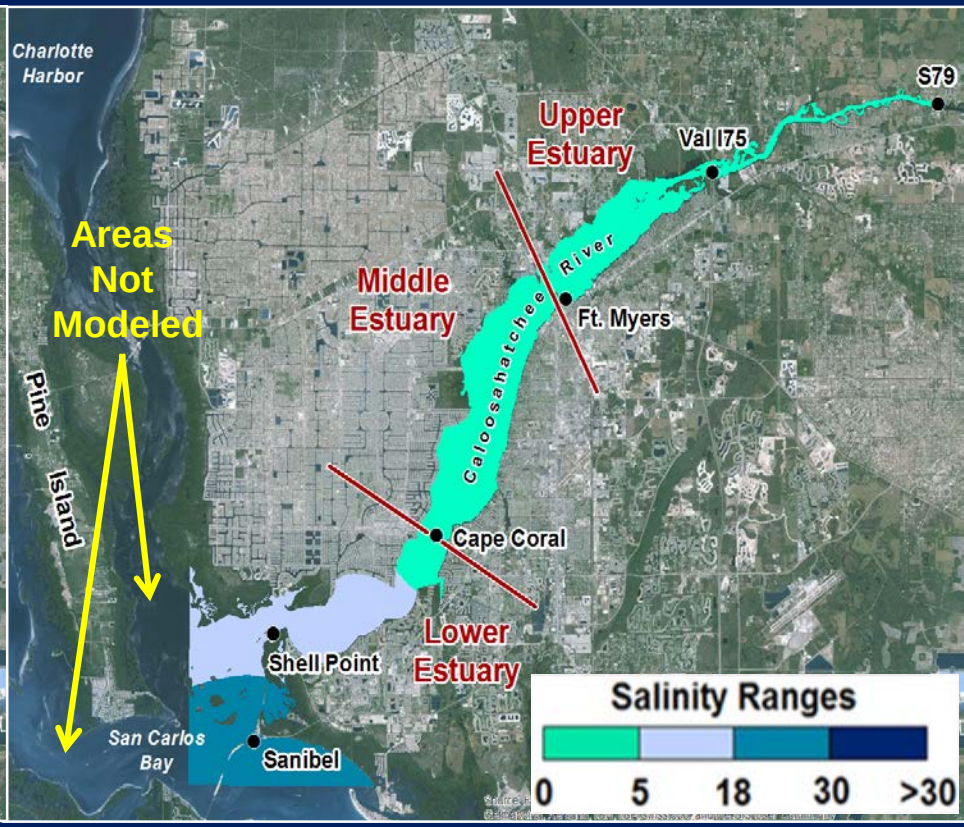
Caloosahatchee Estuary

Salinity Conditions

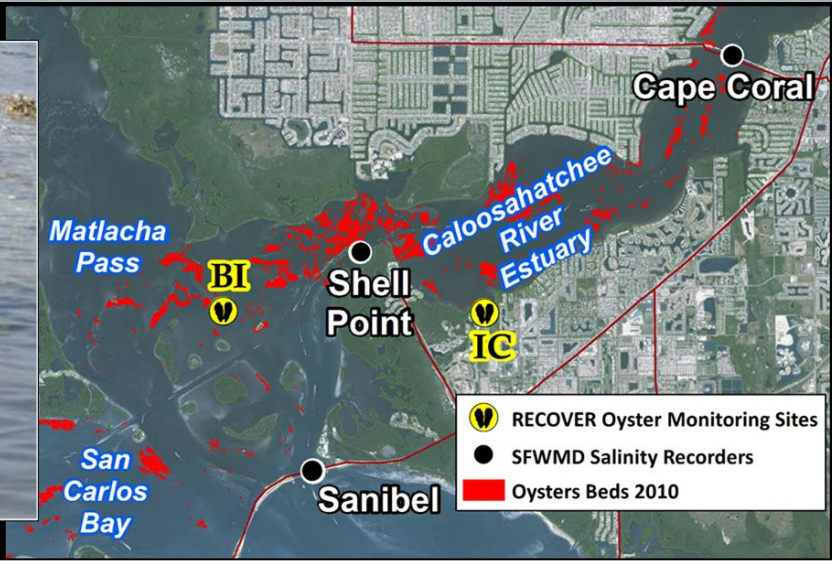
July 11, 2016



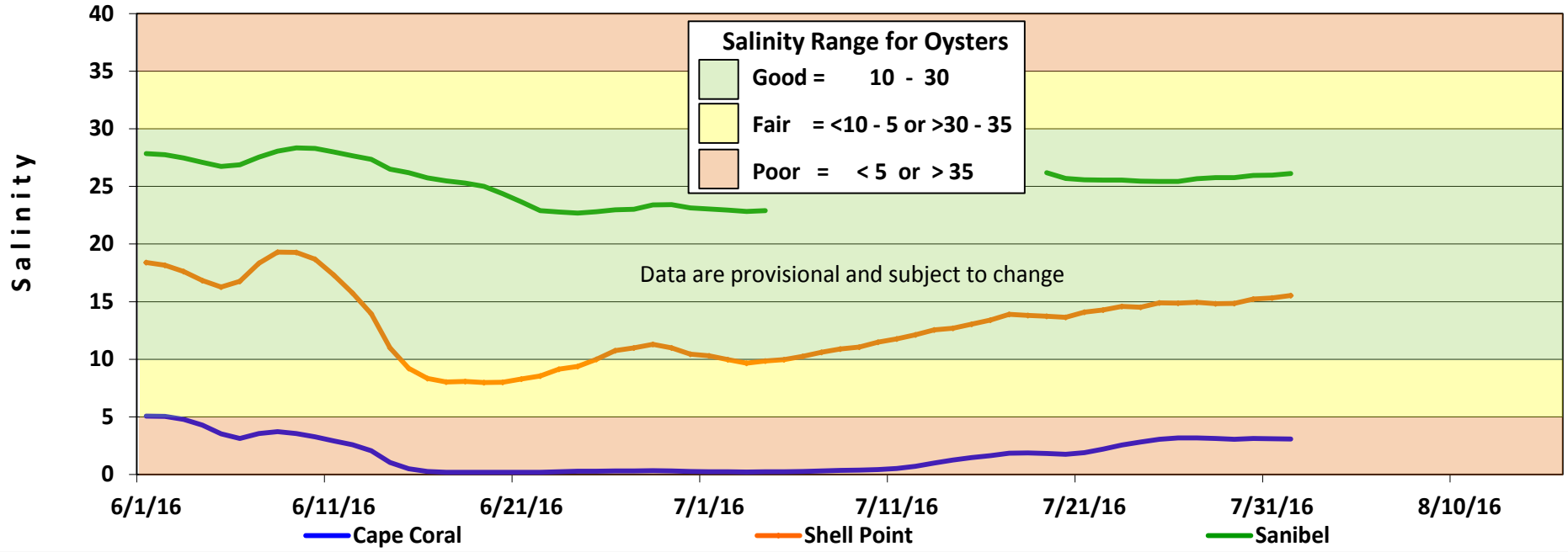
August 1, 2016



Caloosahatchee Estuary Oysters



Seven day mean salinity of the water column at 3 monitoring stations in the Caloosahatchee Estuary



Caloosahatchee Estuary
Submerged Aquatic Vegetation